CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC(QB)/2014-15

12.06.2014

TEST REPORT

CLIENT	:	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	:	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	:	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE ID	:	Bitumen
DATE OF TESTING		12.06.2014

The results of the tests conducted on the bitumen sample

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2006
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	62.0	60 to 70
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	54.0	Min. 45
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	> 100	Min. 50
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	275 ^{0}C	Min. 220
5	Fire Point, ^{0}C	IS :1209 -1978 (RA-2009)	315 ^{0}C	-

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ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು
ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ
ಬಿಬಿಎಂಪಿ, ಬೆಂಗಳೂರು-24

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC(QB)/2014-15 13.06.2014

TEST REPORT

CLIENT	:	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	:	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	:	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	:	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE ID	:	Bitumen
DATE OF TESTING		13.06.2014

The results of the tests conducted on the bitumen sample

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2006
1	Penetration at 25 ^{0}C, 1/10 mm	IS :1203 -1978 (RA-2009)	66.0	60 to 70
2	Softening point, ^{0}C	IS :1205 -1978 (RA-2009)	58.0	Min. 45
3	Ductility at 27^{0}C, cm	IS :1208 -1978 (RA-2009)	> 100	Min. 50
4	Flash Point, ^{0}C	IS :1209 -1978 (RA-2009)	280 ^{0}C	Min. 220
5	Fire Point, ^{0}C	IS :1209 -1978 (RA-2009)	325 ^{0}C	-

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12.06.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Source / Location	Hot Mix Plant, Mysore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	12.06.2014

Sl No.	Details	Trial No.			Average
		1	2	3	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	374	376	378	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	79	81	83	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	295	295	295	
4	Aggregate Impact value = percent fines	21.12	21.54	21.96	
	100* (W_2/W_1)%				21.54

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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12.06.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Source / Location	Hot Mix Plant, Mysore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	12.06.2014

Sl No.	Details	Trial No.			Average
		1	2	3	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	381	383	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	84	86	89	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	297	297	296	
4	Aggregate Impact value = percent fines	22.05	22.45	23.12	
	100* (W_2/W_1)%				22.54

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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12.06.2014

Aggregate Impact Value

IS: 2386 Part IV

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Source / Location	Hot Mix Plant, Mysore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	12.06.2014

Sl No.	Details	Trial No.			Average
		1	2	3	
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	378	382	384	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	81	84	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	297	298	298	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.43	21.99	22.40	21.94

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.06.2014

Result : Flakiness Index = **13.25%**

Elongation Index = **11.38%**

Result : Combined Flakiness & Elongation index **24.63%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/AIV/2014-15 13.06.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.06.2014

Result : Flakiness Index = **13.46%**

Elongation Index = **11.59%**

Result : Combined Flakiness & Elongation index **25.05%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/AIV/2014-15 13.06.2014

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Technical Reference	IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	13.06.2014

Result : Flakiness Index = **13.52%**

Elongation Index = **11.84%**

Result : Combined Flakiness & Elongation index **25.36%**

Comments:

→ Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/Stripping/2014-15 16.06.2014

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	16.06.2014

Type of binder : 60/70
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.30	96.70
2	3.3		
3	3.5		

Comments:

→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Specific Gravity And Water Absorption Test

IS: 2386 Part III

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Mysore
Date of Testing	17.06.2014

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	1998	2010	2012	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1243	1255	1257	
4	Weight of saturated surface dry aggregate in air	W_3 g	2007	2020	2018	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	764	765	761	
6	Weight of oven dried aggregate	W_4 g	1989	2004	2001	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.603	2.620	2.629	2.617
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.666	2.676	2.690	2.677
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.90%	0.80%	0.85%	0.85%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/Bitumen/2014-15 16.06.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 164

CLIENT	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE I/D	Roads in Anjandri Layout, Ward No. 06
DATE OF TESTING	16.06.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	476.5	476
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	23.5	24.00
7. Bitumen content in %	4.70	4.80
8. Average	4.75	

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ಬ್ಯಾಟರಾಯನಪುರ ಉಪ ವಿಭಾಗ

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CIVIL-TECH CONSULTANTS AND ENGINEERS

Building & Highway Material Testing Laboratory

NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/Gradation/2014-15 16.06.2014

BITUMEN GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 30

CLIENT	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE I/D	Roads in Anjandri Layout, Ward No. 06
DATE OF TESTING	16.06.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.43	5.34	5.34	94.66	90-100
4.75	251.87	52.86	58.20	41.80	35-51
2.36	79.65	16.72	74.91	25.09	24-39
1.18	34.25	7.19	82.10	17.90	15-30
0.3	23.16	4.86	86.96	13.04	9-19
0.075	31.48	6.61	93.57	6.43	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	35.95	7.55	7.55	92.45	90-100
4.75	248.75	52.26	59.81	40.19	35-51
2.36	51.63	10.85	70.66	29.34	24-39
1.18	51.38	10.79	81.45	18.55	15-30
0.3	22.69	4.77	86.22	13.78	9-19
0.075	41.72	8.76	94.98	5.02	3-8

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/Bitumen/2014-15 17.06.2014

BITUMEN CONTENT DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 164

CLIENT	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE I/D	Roads in Anjandri Layout, Ward No. 06
DATE OF TESTING	17.06.2014

BITUMEN CONTENT DETERMINATION

Description	Trail 1	Trail 2
1. Weight of Mixture before Test, g	500	500
2. Weight of Mixture after Test, g	475.5	476.5
3. Weight of Asphalt and Mineral matter Extracted, g	-	-
4. Weight of Mineral Matter, g.	-	-
5. Weight of Ash, g		
6. Weight of Bitumen Extracted, g. (corrected)	24.5	23.50
7. Bitumen content in %	4.90	4.70
8. Average	4.80	

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ಪಾಲಿಕೆ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರ
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BITUMEN GRADATION DETERMINATION OF SEMI DENSE BITUMINOUS CONCRETE MIX

AASHTO T 30

CLIENT	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
AGENCY	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
NAME OF THE WORK	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
REFERENCE	EE/BTP/BBMP/KRIDL/WO/ /2013-14
SAMPLE I/D	Roads in Anjandri Layout, Ward No. 06
DATE OF TESTING	17.06.2014

GRADATION AFTER EXTRACTION

Sieve Size in mm	Trail 1				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	25.82	5.43	5.43	94.57	90-100
4.75	262.37	55.18	60.61	39.39	35-51
2.36	43.16	9.08	69.68	30.32	24-39
1.18	44.82	9.43	79.11	20.89	15-30
0.3	23.95	5.04	84.15	15.85	9-19
0.075	48.43	10.19	94.33	5.67	3-8

Sieve Size in mm	Trail 2				Specified Limits as per MORTH specification table 500-4 (Grading-2)
	Weight Retained, gm	% Retained	%Cummulative Retained	% Passing	
13.2	0	0	0	100	100
9.5	26.65	5.59	5.59	94.41	90-100
4.75	269.43	56.54	62.14	37.86	35-51
2.36	47.52	9.97	72.11	27.89	24-39
1.18	36.26	7.61	79.72	20.28	15-30
0.3	29.82	6.26	85.98	14.02	9-19
0.075	35.19	7.39	93.36	6.64	3-8

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Job No.: CTCE/BBMP/WNo.06/KRIDL/SDBC/AGG/2014-15 16.06.2014

Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Sample I / D	Hot Mix Plant, Mysore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	16.06.2014

Total Weight of Sample: 5450 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	386	7.1	7.08	92.92	90-100	
4.75	2847	52.2	59.32	40.68	35-51	
2.36	665	12.2	71.52	28.48	24-39	
1.18	463	8.5	80.02	19.98	15-30	
0.3	452	8.3	88.31	11.69	9-19	
0.075	374	6.9	95.17	4.83	3-8	

Total Weight of Sample: 5150 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	326	6.3	6.33	93.67	90-100	
4.75	2512	48.8	55.11	44.89	35-51	
2.36	706	13.7	68.82	31.18	24-39	
1.18	513	10.0	78.78	21.22	15-30	
0.3	469	9.1	87.88	12.12	9-19	
0.075	363	7.0	94.93	5.07	3-8	

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Aggregate Gradation Test

IS : 2386 Part I

Client	**Asst. Executive Engineer,** Byatarayanapura Sub Division, BBMP, Bangalore.
Agency	**Technical Manager (West),** KRIDL, BBMP, Bangalore.
Name of the Work	Improvements to roads and drains at Amarajothi Colony, Anjandri Layout in Ward No. 06, Thanisandra Village Limits, BBMP, Bangalore.
Reference	EE/BTP/BBMP/KRIDL/WO/ /2013-14
Sample I / D	Hot Mix Plant, Mysore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	17.06.2014

Total Weight of Sample: 5725 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	398	7.0	6.95	93.05	90-100	
4.75	2795	48.8	55.77	44.23	35-51	
2.36	826	14.4	70.20	29.80	24-39	
1.18	472	8.2	78.45	21.55	15-30	
0.3	464	8.1	86.55	13.45	9-19	
0.075	453	7.9	94.46	5.54	3-8	

Total Weight of Sample: 6275 gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	458	7.3	7.30	92.70	90-100	
4.75	2962	47.2	54.50	45.50	35-51	
2.36	715	11.4	65.90	34.10	24-39	
1.18	552	8.8	74.69	25.31	15-30	
0.3	537	8.6	83.25	16.75	9-19	
0.075	628	10.0	93.26	6.74	3-8	

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